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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,611	02/07/2005	Shigeru Yamago	2005-0119A	1336

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EXAMINER	
BERNSHTEYN, MICHAEL	

ART UNIT	PAPER NUMBER
1713	

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/523,611	YAMAGO ET AL.
	Examiner	Art Unit
	Michael Bernshteyn	1713

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *7-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 13-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-27* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-6 and 13-27 in the reply filed on June 9, 2006 is acknowledged. The traversal is on the ground(s) that the Examiner has failed to cite any reference, which indicates that any of the present claims fails to define over the prior art. Therefore, the presumption is that the inventions of Group I-III do have the same or corresponding special technical features. This is not found persuasive because the special technical feature of Group I claims is an organotellurium compound, the special technical feature of Group II claims is a process for producing a living radical polymer, and the special technical feature of Group III claims is a block copolymer. Therefore unity of invention is lacking

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 1-6 and 13-27 are active.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-6 and 13-27 are rejected under 35 U.S.C. 102(a) as being anticipated by Yamago et al. ("Tailored Synthesis of Structurally Defined polymers by Organotellurium-Mediated Living Radical Polymerization", Journal of American Chemical Society, 2002, 124, 13666-13667).

Yamago discloses a highly versatile method for the synthesisi of block copolymers based on organotellurium-mediated living radical polymerization (TEPR).

TEPR is extremely general and can polymerize different families of monomers, such as styrenes, acrylates, and methacrylates, using the same initiators at a highly controlled manner. Furthermore, the versatility of TEPR allows the synthesis of various AB-, ABA-, and ABC block copolymers starting from a singly monofunctional initiator, regardless of the order of monomer addition (page 13666, 1st column, 3rd paragraph).

Yamago discloses that the effect of the dimethyl ditelluride strongly suggests that the polymerization proceeds via the detelluride-capping mechanism as shown in Scheme 2 (see below); the tellurium radical generated by the bond homolysis of 1 forms dimethyl ditelluride, which serves as the capping reagent of the polymer end radicals (page 13667, 1st column, 2nd paragraph).

Yamago discloses that the TEPR process would be suitable for a tailored synthesis of block copolymers using macroinitiators, because the same initiators can control the polymerization of different types of monomers under similar thermal conditions. ABA and ABC triblock copolymers could also be prepared strating from diblock macroinitiators in a highly controlled manner (page 13667, 2nd column, 1st paragraph).

Therefore, all the limitations of instant claims 1-6 and 13-27 are expressly met by Yamago.

Scheme 2

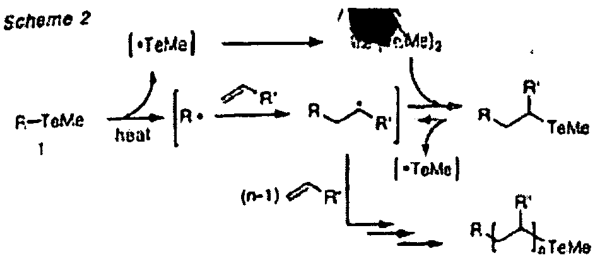


Table 2. Synthesis of AB Di- and ABA Tri- and ABC Triblock Copolymers Using Macroinitiators

entry	macroinitiator[a]	M_n/PD[b]	monomer[c]	yield (%)	M_n/PD[b]
	AB Diblock Copolymer				
1	PolySt	9000/1.15	MMA[d]	85	13900/1.25
2	PolySt	9000/1.15	tBA	50	11300/1.18
3	PolyMMA	8500/1.12[e]	St	85	18800/1.13
4	PolyMMA	8500/1.12[e]	tBA	57	17100/1.11
5	Poly(tBA)	9600/1.10[e]	St	77	19200/1.32
6	Poly(tBA)	8200/1.19[e]	MMA[d]	88	19500/1.35
	ABA Triblock Copolymer				
7	PolyMMA-*b*-polySt	18700/1.18	MMA[d]	85	28100/1.22
8	PolyMMA-*b*-poly(tBA)	11000/1.11	MMA[d]	83	18600/1.30
	ABC Triblock Copolymer				
9	PolySt-*b*-polyMMA	12600/1.30	tBA	32	16100/1.27
10	PolyMMA-*b*-polySt	19000/1.13	tBA	45	21800/1.18
11	PolyMMA-*b*-poly(tBA)	11500/1.09	St	69	21600/1.27

[a] The macroinitiator was prepared from **1b** and the corresponding monomer according to the conditions shown in Table 1 (see also Supporting Information). [b] Molecular weight (M_n) and polydispersity (PD) were calibrated by size-exclusion chromatography using polySt standards for crude samples. [c] St: styrene. 100 equiv and 200 equiv of monomers were used for the diblock and triblock copolymer synthesis, respectively. [d] 1 equiv of $(MeTe)_2$ was added. [e] Calibrated using polyMMA standards.

4. Claims 1-6 and 13-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamago et al. ("Organotellurium Compound as Novel Initiators for Controlled/Living radical Polymerizations. Synthesis of Functionalized Polystyrenes and End-Group Modifications", Journal of the American Chemical Society, 124 (12), 2874-2875, 2002.02.27) in view of Leonard et al. (4,124,633).

With regard to the limitation of claims 1-6 and 13-27, Yamago discloses the advantages of organotellurium compound compounds over nitroxides, e.g., more facile synthesis of tailor-made initiators and easy of polymer-end group modifications, would be highly useful in the synthesis and synthetic transformations of these compounds.

Yamago discloses several new organotellurium-based initiators for cotrolled/ living radical polymerization of styrene derivatives that allows accurate weight controlwith defined end-groups, which can be transformed into a variety of end-group modified polystyrenes (page 2874, 1st column, 2nd paragraph).

Yamago discloses bulk polymerization of styrene (X=H) with the polymeric-end mimetic initiator 1a (R=Me) initiated the polymerization efficiently, and afforded polystyrene with the predicted molecular weight and low polydispersity (M_n = 9200, PD = 1.17) in 96% yield (Table 1, entry 1).

Scheme 1

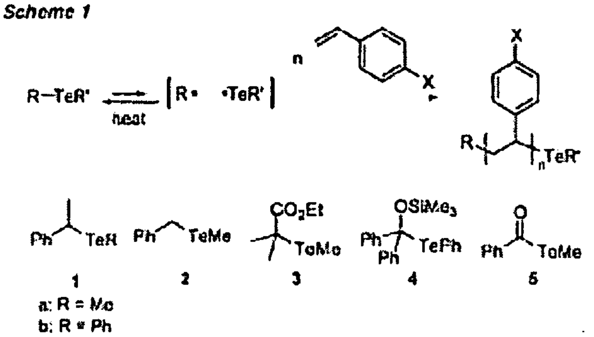


Table 1. Effects of Initiators for Polymerization of Styrene[a]

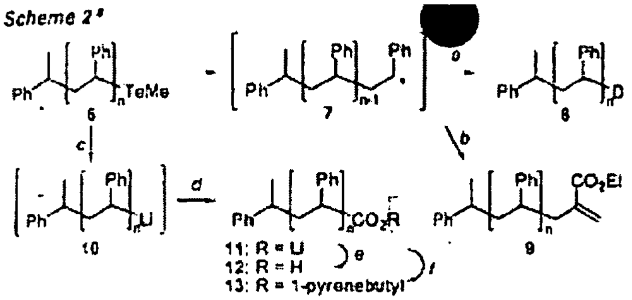
entry	X	initiator	conversion (%)	M_n[b]	PD[b]	BDE (kJ/mol)[c]
1	H	1a	96	9 200	1.17	123
2	H	1b	91	15 900	1.45	112
3	H	2	89	9 000	1.46	142
4	H	3	79	9 000	1.15	114
5	H	4	76	50 700	1.80	25
6	H	5	83	25 400	1.58	182
7[d]	H	1a	78	35 700	1.21	
8[e]	H	1a	84	62 600	1.30	
9	Cl	1a	88[f]	8 800	1.41	
10	OMe	1a	94[g]	10 900	1.17	

[a] Bulk polymerization was carried out with 100 equiv of styrene at 105 °C for 16−18 h under a nitrogen atmosphere. [b] Molecular weight (M_n) and polydispersity (PD) were calibrated by size exclusion chromatography using polystyrene standards for samples after single precipitation from MeOH. [c] Bond dissociation energy of the initiator obtained by B3LYP DFT calculations with the LANL2DZ basis set for tellurium atom and the 6-31G(d) basis set for the rest. [d] The reaction was carried with 500 equiv of styrene. [e] The reaction was carried out with 1000 equiv of styrene. [f] The reaction was carried out at 100 °C for 17 h. [g] The reaction was carried out at 100 °C for 36 h.

It is the Examiner position, that organotellurium compounds of the above formulas 1a, 1b, 2 are substantially identical to the claimed formula (1).

The initiators 1a and 3 promoted polymerization under much milder conditions. Molecular weight increased linearly with increase of styrene, and the products were obtained with low polydispersity (entries 7 and 8).

Scheme 2[a]



[a] AIBN (0.1 equiv), Bu_3SnD (3 equiv), $C_6H_5CF_3$, 80 °C, 4 h. [b] AIBN (0.1 equiv), ethyl (tributylstannylmethyl)acrylate (4 equiv), $C_6H_5CF_3$, 80 °C, 6 h. [c] BuLi (1.5 equiv), THF, −72 °C, 3 min. [d] CO_2 (excess). [e] Aqueous HCl (excess). [f] 2,4,6-$Cl_3C_6H_2COCl$ (2 equiv), Et_3N (2 equiv), THF, room temperature, 1.5 h, then 1-pyrenebutanol (4 equiv), DMAP (4 equiv), CH_2Cl_2, room temperature, 3 h.

The "living" nature of the current polymerization was ascertained by several control experiments. First, the molecular weight (M_n) increased linearly with an increase in the amount of styrene used. Second, the molecular weight also increased linearly with an increase of the conversion of styrene. Third, a block copolymer was formed by the treatment of starting polystyrene block prepared from 1a and 100 equiv of styrene with 4-methoxystyrene (100 equiv). Finally, the high level of fidelity of the end-group was confirmed by labeling experiments. Thus, treatment of polymer block 6 prepared from 1a and 100 equiv of styrene with tributyltin deuteride afforded 8 quantitatively through the radical intermediate 7 (page 2875, 1st column, 1st paragraph).

Yamago does not disclose the use of compound represented by the formula (2).

Leonard discloses a process for the preparation of acrylic acid or methacrylic acid, which comprises catalytically decomposing or converting in the presence of tellurium (abstract).

The tellurium catalysts, which may be utilized in the process, are tellurium per se or an organic or inorganic tellurium compound or mixtures thereof.

Representative tellurium catalysts, in addition to tellurium per se include, for example, organic tellurium compounds such as methyl and dimethyl telluride, diphenyl and tetraphenyl telluride, **diphenyl** and **diethyl ditelluride**, dimethyl tellurium dichloride, dibromide, diiodide and difluoride, diphenyl telluroxide, phenyl tellurols and 2-chlorocyclohexyltellurium trichloride, etc., may be employed. The preferred organic tellurium catalysts are **diphenyl telluride** and **ditelluride** (col. 4, lines 4-28).

Both references are analogous art because they are from the same field of endeavor concerning using tellutium derivatives for polymerization process of vinyl monomers.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate tellurium compounds, such as diphenyl and diethyl ditelluride, etc. as taught by Leonard in Yamago's polymerization process of vinyl monomers because any organic or inorganic tellurium salt having an anion, which does not unduly retard the formation of the desired products by an extraneous side reaction can be utilized as a catalyst to decompose the peroxide intermediates (US'633, col. 4, lines 7-11), and thus to arrive at the subject matter of instant claim 1 and dependable claims 2-6 and 13-27.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael Bernshteyn
Patent Examiner
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0817/2006

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